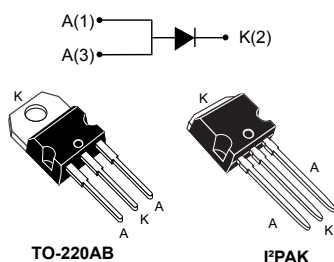


## 100 V power Schottky rectifier



### Features

- High current capability
- Avalanche rated
- Low forward voltage drop
- High frequency operation
- ECOPACK®2 compliant

### Applications

- Switching diode
- SMPS
- DC/DC converter
- LED lighting
- Desktop power supply

### Description

This single Schottky rectifier is suited for high frequency switch mode power supply.

Packaged in TO-220AB and I²PAK, the [STPS20SM100S](#) is intended to be used in notebook, game station and desktop adaptors, providing in these applications a good efficiency at both low and high load.

Product status link	
<a href="#">STPS20SM100S</a>	
Product summary	
$I_{F(AV)}$	20 A
$V_{RRM}$	100 V
$T_j \text{ (max.)}$	150 °C
$V_F \text{ (typ.)}$	0.63 V

## 1 Characteristics

**Table 1. Absolute ratings (limiting values, with terminals 1 and 3 short circuited, at 25 °C, unless otherwise specified)**

Symbol	Parameter		Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage		100	V
$I_{F(RMS)}$	Forward rms current		30	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$ , square wave	$T_C = 125\text{ °C}$	20	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal	350	A
$P_{ARM}$	Repetitive peak avalanche power	$t_p = 10\text{ }\mu\text{s}$ , $T_j = 125\text{ °C}$	1080	W
$T_{stg}$	Storage temperature range		-65 to +150	°C
$T_j$	Maximum operating junction temperature <sup>(1)</sup>		150	°C

1.  $(dP_{tot}/dT_j) < (1/R_{th(j-a)})$  condition to avoid thermal runaway for a diode on its own heatsink.

**Table 2. Thermal resistance parameter**

Symbol	Parameter	Max. value	Unit
$R_{th(j-c)}$	Junction to case	1.3	°C/W

For more information, please refer to the following application note:

- AN5088: Rectifiers thermal management, handling and mounting recommendations

**Table 3. Static electrical characteristics (with terminals 1 and 3 short circuited)**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R$ <sup>(1)</sup>	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-	10	30	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	10	30	mA
		$T_j = 25\text{ °C}$	$V_R = 70\text{ V}$	-	5		$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	5		mA
$V_F$ <sup>(2)</sup>	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 5\text{ A}$	-	565		mV
		$T_j = 125\text{ °C}$		-	480		
		$T_j = 25\text{ °C}$	$I_F = 10\text{ A}$	-	685		
		$T_j = 125\text{ °C}$		-	560	620	
		$T_j = 25\text{ °C}$	$I_F = 20\text{ A}$	-	800	900	
		$T_j = 125\text{ °C}$		-	630	700	

1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 0.6 \times I_{F(AV)} + 0.005 \times I_F^2 \text{ (RMS)}$$

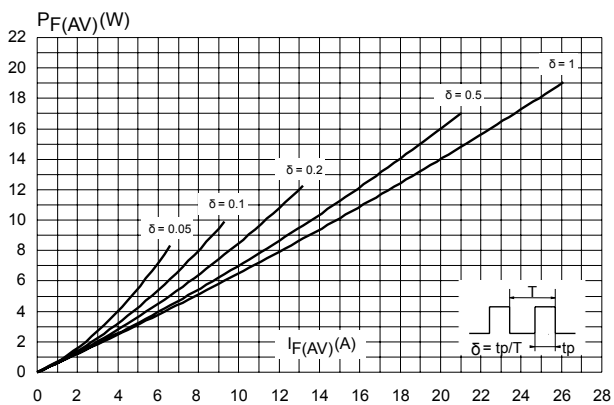
For more information, please refer to the following application notes related to the power losses:

- AN604: Calculation of conduction losses in a power rectifier

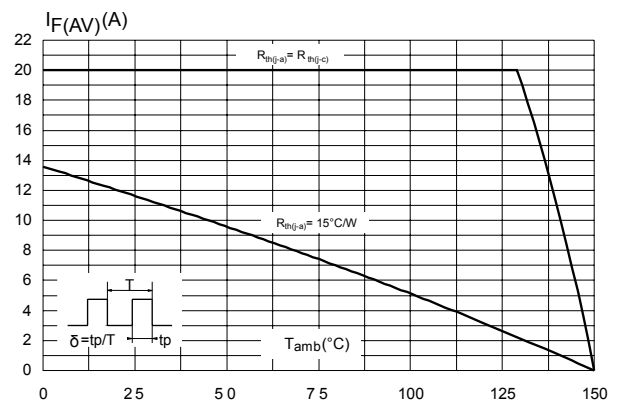
- AN4021: Calculation of reverse losses on a power diode

## 1.1 Characteristics (curves)

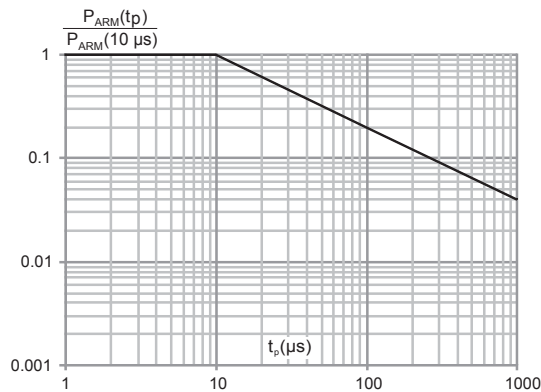
**Figure 1. Average forward power dissipation versus average forward current (terminals 1 and 3 short circuited)**



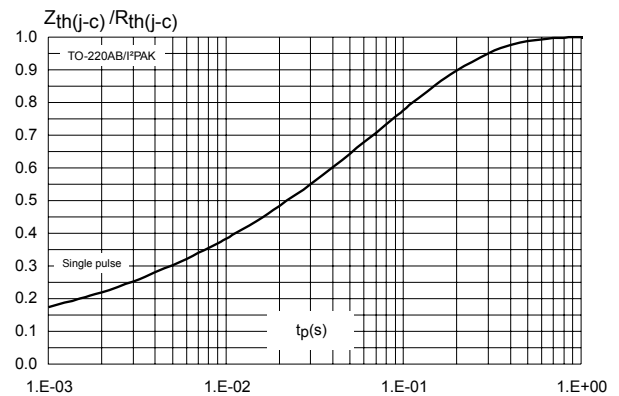
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , terminals 1 and 3 short circuited)**



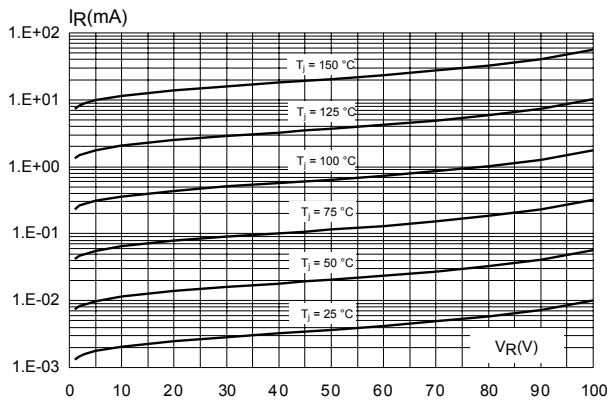
**Figure 3. Normalized avalanche power derating versus pulse duration ( $T_j = 125^\circ\text{C}$ )**



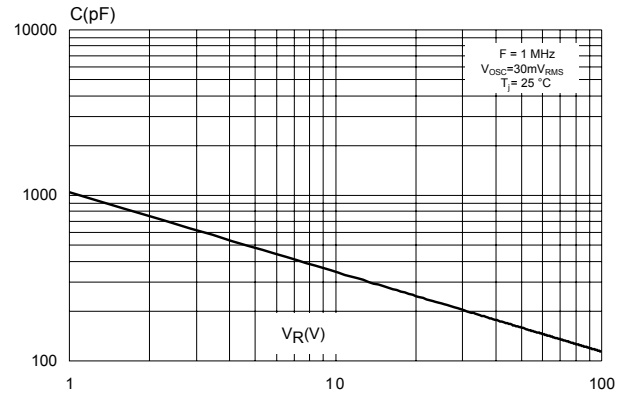
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



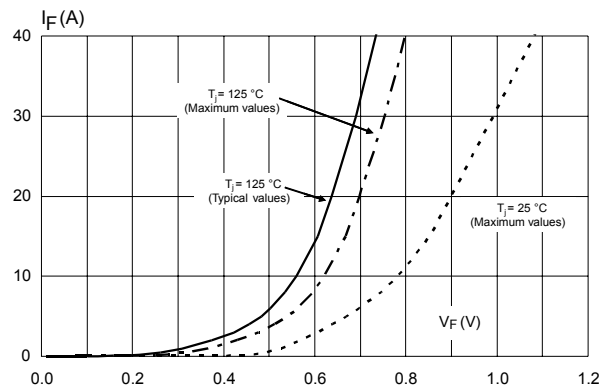
**Figure 5. Reverse leakage current versus reverse voltage applied (typical values)**



**Figure 6. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 7. Forward voltage drop versus forward current (terminals 1 and 3 short circuited)**



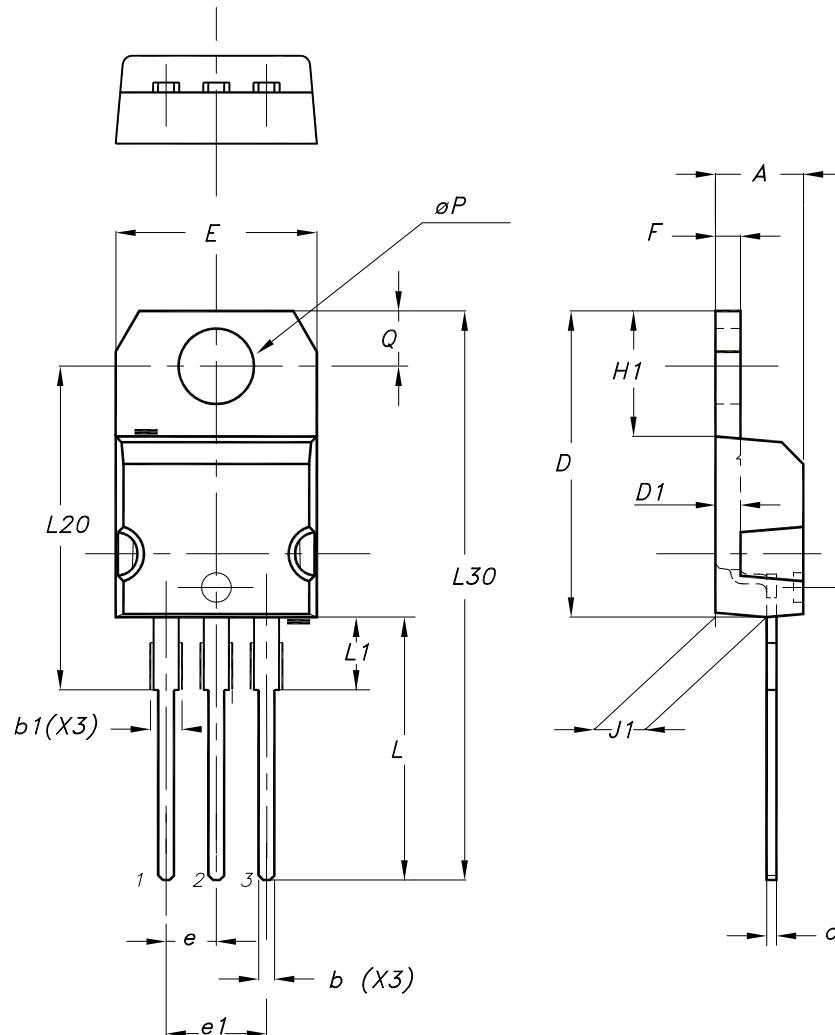
## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK®** packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

### 2.1 TO-220AB package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

**Figure 8. TO-220AB package outline**



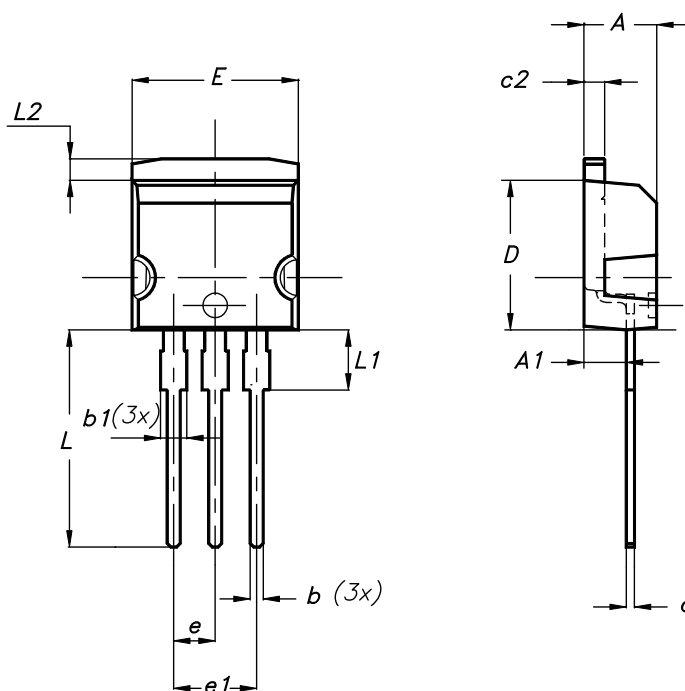
**Table 4. TO-220AB package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.240	0.035
b1	1.14	1.55	0.045	0.061
c	0.48	0.70	0.019	0.028
D	15.25	15.75	0.600	0.620
D1	1.27 typ.		0.050 typ.	
E	10.00	10.40	0.394	0.409
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.244	0.260
J1	2.40	2.72	0.094	0.107
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L20	16.40 typ.		0.646 typ.	
L30	28.90 typ.		1.138 typ.	
θP	3.75	3.85	0.148	0.152
Q	2.65	2.95	0.104	0.116

## 2.2 I<sup>2</sup>PAK package information

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0

**Figure 9. I<sup>2</sup>PAK package outline**



**Table 5. I<sup>2</sup>PAK package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10.00	10.40	0.394	0.409
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L2	1.27	1.40	0.050	0.055

### 3 Ordering information

**Table 6. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS20SM100ST	PS20SM100ST	TO-220AB	1.95 g	50	Tube
STPS20SM100SR	PS20SM100SR	I <sup>2</sup> PAK	1.50 g	50	Tube



## Revision history

**Table 7. Document revision history**

Date	Revision	Changes
25-Mar-2009	1	First issue.
16-Apr-2010	2	Updated package graphic for TO-220AB on front page and in <i>Table 5</i> .
11-May-2017	3	Removed TO-220FPAB and D <sup>2</sup> PAK packages.
17-Oct-2018	4	Updated cover page and <a href="#">Table 1. Absolute ratings (limiting values, with terminals 1 and 3 short circuited, at 25 °C, unless otherwise specified)</a> . Removed figure 1 and figure 9. Minor text changes to improve readability.

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